

Ultraflat Tip-Tilt-Piston MEMS Deformable Mirror, Phase II

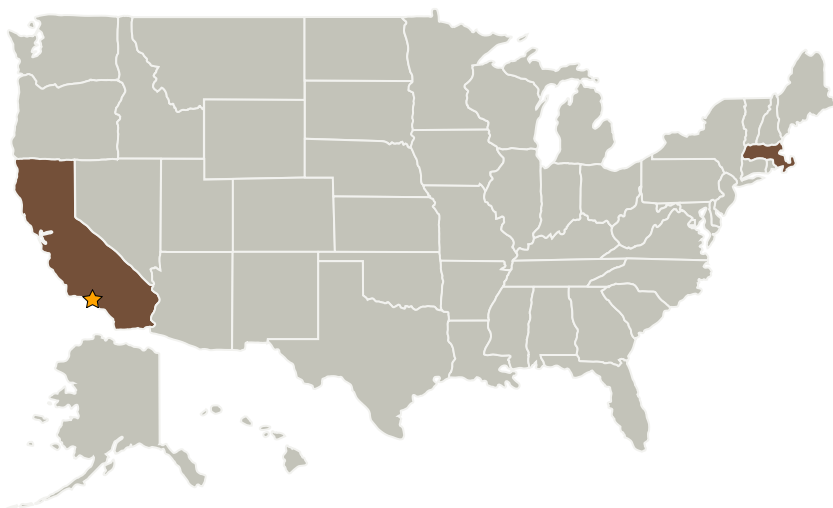
Completed Technology Project (2006 - 2008)



Project Introduction

This proposal describes a Phase II SBIR project to develop high-resolution, ultraflat micromirror array devices using advanced silicon surface micromachining technology and building on process innovations demonstrated in a successful Phase I research effort. Each device will be comprised of 331 close-packed hexagonal mirror segments. Each segment will be controlled to nanometer-scale tolerances in rotation (tilt) and surface normal translation (piston) using electrostatic actuators. The architecture used in the micromirror design and fabrication processes used, are scalable to array sizes up to 1027 mirror segments with 3081 independent control points. The completed device will be delivered to the Jet Propulsion Laboratory for evaluation in the High Contrast Imaging Testbed. If successful, this project will result in enabling hardware for wavefront control, as needed for starlight canceling coronagraphic instruments. The Phase I project demonstrated actuator designs and mirror segment manufacturing processes that were capable of meeting the unprecedented demands of such instruments with regard to segment optical quality, segment planarity during actuation, and actuation precision and range. In the Phase II effort, these designs and processes will be used to produce a functional, packaged micromirror array that will meet the immediate wavefront control needs for visible nulling coronagraphic testbed instrument. The device is being designed and fabricated to be suitable for space-based operation as part of a future observatory mission.

Primary U.S. Work Locations and Key Partners



Ultraflat Tip-Tilt-Piston MEMS Deformable Mirror, Phase II

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Ultraflat Tip-Tilt-Piston MEMS Deformable Mirror, Phase II

Completed Technology Project (2006 - 2008)



Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Boston Micromachines Corporation	Supporting Organization	Industry	Cambridge, Massachusetts

Primary U.S. Work Locations	
California	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.2 Observatories
 - └ TX08.2.1 Mirror Systems